What is claimed is:

1. A cardiac rhythm management device, comprising:

a sensor for obtaining a signal indicative of an action of a heart;

an impedance measurement circuit adapted to measure transthoracic impedance; and

a processor for utilizing the signal indicative of the action of the heart to sample the transthoracic impedance at sampling intervals commenced by fiducial markers in the signal indicative of the action of the heart, the sampling of the impedance signal removing the component of a stroke volume of the heart from the signal and thereby providing ventilation information.

2. The device of claim 1, wherein the fiducial marker is an onset of a P-wave.

3. The device of claim 1, wherein the fiducial marker is an onset of a QRS complex.

4. The device of claim 1, wherein the fiducial marker is an R-wave peak.

5. The device of claim 1, wherein the fiducial marker is a T-wave peak.

6. The device of claim 1, wherein the ventilation information is a signal indicative of respiratory activity.

7. The device of claim 1, wherein the device adjusts a rate of delivering cardiac rhythm management therapy based on ventilation information provided by the sampled impedance signal.

8. The device of claim 1, wherein the sampled values of the impedance signal are combined to reconstruct an impedance signal that removes the stroke volume component and represents respiratory activity.

9. A cardiac rhythm management system comprising:

at least one endocardial lead adapted to be coupled to a plurality of locations in a thorax of a patient, wherein the at least one endocardial lead includes at least one electrode; and

a cardiac rhythm management device coupled to the at least one endocardial lead, wherein the cardiac rhythm management device includes:

an exciter, for delivering a pulsed current stimulus to an endocardial lead;

a signal processor for detecting fiducial markers in a signal indicative of the action of the heart, and wherein the signal processor also includes a receiver for obtaining transthoracic impedance information responsive to the pulsed current stimulus;

a sampling element coupled to the receiver for obtaining transthoracic impedance in response to an occurrence of a fiducial marker; and

a housing for the cardiac rhythm management device, an outer surface of the housing further comprising a housing electrode, wherein the housing electrode is coupled to the exciter.

10. The system of claim 9, wherein the cardiac rhythm management device further includes:

a therapy circuit, coupled to the at least one endocardial lead, wherein the lead is adapted to be coupled to a heart of a patient for delivering cardiac rhythm management therapy thereto; and

a controller, coupled to the therapy circuit for adjusting a rate of delivery of the cardiac rhythm management therapy based on the sampled transthoracic impedance.

11. The system of claim 9, wherein the signal processor further includes a memory, and wherein the signal processor measures a time interval from a past occurrence of a fiducial marker to a present occurrence of the fiducial marker and stores a value in the memory representative of the measured impedance in association with the measured time interval.

12. The system of claim 11, wherein the value representative of the measured impedance in association with the measured time interval is included in an estimation of lung tidal volume.

13. The system of claim 11, wherein the value representative of the measured impedance in association with the measured time interval is included in a determination a respiratory rate.

14. The system of claim 9, wherein the system further includes a header, coupled to the housing for receiving the at least one endocardial lead, and carrying a header electrode, wherein the header electrode is coupled to the sampling element.

15. The system of claim 14, wherein the exciter applies the pulsed current stimulus from a first endocardial lead electrode across the thorax region of the patient to the housing electrode, and a second endocardial lead electrode and the header electrode are in communication with the receiver for obtaining transthoracic impedance information responsive to the pulsed current stimulus across the thorax region of the patient.

16. The system of claim 15, wherein the pulsed current stimulus is applied as a vector directed from a lead electrode adaptable to be placed in a patient's atrium to the housing of the cardiac rhythm management device.

17. The system of claim 15, wherein the pulsed current stimulus is applied as a vector directed from a lead electrode adaptable to be placed in a patient's atrium to the header of the cardiac rhythm management device.

18. The system of claim 15, wherein the pulsed current stimulus is applied as a vector directed from a lead electrode adaptable to be placed in a patient's ventricle to the housing of the cardiac rhythm management device.

19. The system of claim 15, wherein the pulsed current stimulus is applied as a vector directed from a lead electrode adaptable to be placed in a patient's ventricle to the header of the cardiac rhythm management device.

20. The system of claim 9, wherein the cardiac rhythm management device further includes a selector, wherein the selector is operable to couple the exciter and signal processor to a selected lead, wherein the exciter is coupled to an electrode of one endocardial lead and the signal processor is coupled to a different electrode, and wherein selecting a different lead causes the exciter to apply the pulsed current stimulus as a different vector in the thorax.

21. A method of measuring transthoracic impedance, the method comprising:

detecting fiducial markers in a signal indicative of an action of a heart;

applying a predetermined pulsed current stimulus across a thorax region of a patient in a predetermined time relationship to an occurrence of a fiducial marker;

sampling a voltage across the thorax region while applying the predetermined pulsed current stimulus; and

calculating an impedance from the sampled voltage and the current stimulus.

22. The method of claim 21, wherein the fiducial marker is an onset of a P-wave.

23. The method of claim 21, wherein the fiducial marker is an onset of a QRS complex.

24. The method of claim 21, wherein the fiducial marker is an R-wave peak.

25. The method of claim 21, wherein the fiducial marker is a T-wave peak.

26. The method of claim 21, wherein the method further includes:

storing data representations of the impedance;

measuring a time interval from a first occurrence of a fiducial marker to a second occurrence of the fiducial marker; and

storing the time interval in association with the data representations of the impedance.

27. The method of claim 26, wherein the method further includes estimating a lung tidal volume from the stored impedance values and the stored time intervals.

28. The method of claim 21, wherein the applying the predetermined pulsed current stimulus across a thorax region of a patient includes placing stimulus-applying electrodes at locations selected to define a vector across the thorax region.

29. The method of claim 21, wherein the applying the predetermined pulsed current stimulus includes applying the current stimulus from a first electrode across the thorax region to a second electrode, and wherein the sampling a voltage includes measuring a voltage between a third electrode and a fourth electrode positioned on both sides of the thorax region.

30. The method of claim 21, further including changing a therapy delivered in a system for treating cardiac arrhythmia based on the calculated impedance.

31. The method of claim 30, wherein the changing a therapy delivered includes adjusting the minimum pacing rate.

32. A cardiac rhythm management system comprising:

a plurality of endocardial leads adapted to be coupled to a plurality of locations in a thorax of a patient, wherein each of the plurality of endocardial leads includes at least one stimulus-applying electrode; and

a cardiac rhythm management device coupled to the plurality of endocardial leads, wherein the cardiac rhythm management device includes:

a housing for the cardiac rhythm management device, an outer surface of the housing further comprising a further electrode;

an exciter, coupled to the electrodes for delivering a pulsed current stimulus from the endocardial lead electrodes to the housing electrode;

a signal processor in communication with the electrodes for detecting fiducial markers in a signal indicative of an action of a heart, and wherein the signal processor also includes a receiver for obtaining transthoracic impedance information responsive to the current stimulus; and

means for sampling the transthoracic impedance in response to the occurrence of a fiducial marker in the signal indicative of the action of the heart.

33. The system of claim 32, wherein the endocardial leads further include a first electrode and a second electrode and the cardiac rhythm management device further includes a selector coupled to the exciter and signal processor, wherein the selector is operable to couple the exciter and signal processor to a selected lead, wherein the exciter is coupled to the first electrode of the selected lead and the sampling means is coupled to the second electrode of the selected lead, and wherein selecting a different lead causes the exciter to apply the pulsed current stimulus as a different vector across the thorax to the housing electrode.

34. The system of claim 32, wherein the receiver measures voltage in response to the pulsed current stimulus.

35. A method of treating lung ventilation disorders, the method comprising:

detecting fiducial markers in a signal indicative of an action of a heart;

applying a predetermined pulsed current stimulus across a thorax region of a patient in a predetermined time relationship to the fiducial markers;

sampling a voltage across the thorax region while applying the predetermined current stimulus;

calculating impedance from the sampled voltage and the current stimulus;

determining respiratory activity from the calculated impedance;

determining if the respiratory activity falls below a predetermined level; and

providing a therapy for stimulating breathing activity if the respiratory activity falls below the predetermined level.

36. The method of claim 35, wherein the determining respiratory activity includes calculating a respiratory rate.

37. The method of claim 35, wherein the determining respiratory activity includes calculating respiratory rate and tidal volume.

38. The method of claim 35, wherein the providing a therapy delivered for treating sleep apnea includes providing diaphragmatic pacing.

39. The method of claim 35, wherein the calculating impedance from the measured voltage and the predetermined current stimulus further includes:

storing data representations of impedance;

measuring a time interval from a first occurrence of a fiducial marker to a second occurrence of the fiducial marker; and

storing the time interval in association with the data representations of impedance.

40. The method of claim 39, wherein the determining respiratory activity from the calculated impedance includes estimating a lung tidal volume from the data representations of impedance and the stored time intervals.

41. A method of measuring a transthoracic impedance, the method comprising:

detecting fiducial markers in a signal indicative of the action of the heart;

a step of applying a predetermined pulsed current stimulus across a thorax region of a patient in a fixed relationship to the occurrence of a fiducial marker;

sampling a voltage across the thorax region when applying the predetermined pulsed current stimulus; and

calculating an impedance from the measured voltage and the predetermined pulsed current stimulus.

42. The method of claim 41, wherein the step of applying a current stimulus is initiated in a fixed relationship to the occurrence of an onset of a P-wave.

43. The method of claim 41, wherein the step of applying a current stimulus is initiated in a fixed relationship to the occurrence of an onset of a QRS complex.

44. The method of claim 41, wherein the step of applying a current stimulus is initiated in a fixed relationship to the occurrence of an R-wave peak.

45. The method of claim 41, wherein the step of applying a current stimulus is initiated in a fixed relationship to the occurrence of a T-wave peak.